

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Javit A. Drake et al.	Art Unit	: 1745
Serial No.	: 10/664,822	Examiner	: Robert W. Hodge
Filed	: September 16, 2003	Conf. No.	: 3431
Title	: ENHANCED FUEL DELIVERY FOR DIRECT METHANOL FUEL CELLS		

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Commissioner for Patents

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APPEAL BRIEF ON BEHALF OF JAVIT A. DRAKE ET AL.

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(1) Real Party in Interest

The real party in interest is The Gillette Company, Prudential Tower Building, Boston MA. The Gillette Company was acquired by The Procter & Gamble Company in 2005.

(2) Related Appeals and Interferences

The appellant is not aware of any appeals or interferences related to the above-identified patent application.

(3) Status of Claims

This is an appeal from the decision of the Primary Examiner in an office action dated **June 4, 2009**, rejecting claims 11-33 all of the claims remaining under consideration in the application. Claims 34-39 were previously withdrawn from consideration.

Claims 1-10 were canceled in a previously filed response to the final office action dated February 3, 2009. Appellant filed a Notice of Appeal on March 13, 2009 and an Appeal Brief on April 13, 2009, which resulted in the above mentioned office action of June 4, 2009 from which Appellant now appeals.

In the February 3, 2009, the examiner had rejected Claims 3, 11-20, 22-30, 32 and 33 under 35 U.S.C. 103(a) as being unpatentable over Hockaday (6,645,651) in view of Kaschemekat (5,069,793) and Claims 21 and 31 under 35 U.S.C. 103(a) as being unpatentable over Hockaday in view of Kaschemekat, and further in view of Wohlstadter (6,207,369).

Appellant contends in view of the proceedings to date that the examiner has conceded that claims 11-23 are allowable over the art of record.

A new notice of appeal is filed herewith.

Claims 11-33 are the subject of this appeal.

(4) Status of Amendments

All previously filed amendments have been entered.

(5) Summary of Claimed Subject Matter

Claim 11

Appellant's claim 11 is directed to a fuel cell cartridge that includes a housing and a fuel egress port. *"Referring to FIGS. 2A-2C, a fuel cartridge 12 has a fuel delivery interface, that is complementary to the interconnect 16 (FIG. 1), including an egress port 32, as shown."*¹

Inventive features of Appellant's claim 11 include a composite membrane residing in the housing of the fuel cartridge. *"Referring to FIG. 2B, a multilayer membrane 48 includes a series of layers 48a or folds of polymer membrane disposed about a periphery of the cartridge 12 to increase membrane surface area."*² The composite membrane includes a porous substrate, a polymer membrane disposed over a first surface of the porous substrate *"An example of the multilayer membrane 48 as wound-cell includes vaporization membrane 48a disposed over a first surface of a substrate 48b of porous material that holds methanol in a liquid state within pores of the material to enable the liquid methanol to migrate to the membrane 48a and convert to a vapor phase."*³ and a coating of a methanol-impermeable material disposed over an opposite surface of the substrate. *"An opposite surface of the sponge material 46b is coated with a methanol-impermeable layer 48c, which can be fabricated from materials such as a cross-linked rubber, a polymer/inorganic composite, a surface treated material such as surface fluorinated high density polyethylene, or other methanol-impermeable material."*⁴

Claim 24

Appellant's claim 24 is directed to a composite membrane that includes a porous substrate, a polymer membrane disposed over a first surface of the porous substrate and a coating of a methanol-impermeable material disposed over an opposite surface of the substrate. Claim 24 is supported in the same manner as the analogous features of claim 11.

¹ Appellant's Specification, Page 5, lines 8-9

² Appellant's Specification, Page 6, lines 23-25

³ *Id.*, Page 6, lines 25-28

⁴ *Id.*, Page 7, lines 10-13

(6) Grounds of Rejection to be Reviewed on Appeal

1. Claims 11-23 stand rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling.
2. Claims 11-23 stand rejected under 35 U.S.C. 112, second paragraph, as failing to set forth subject matter which Applicant regards as their invention.
3. Claims 24-30, 32 and 33 stands rejected under 35 U.S.C. 102(b) as anticipated by Kaschemekat (U.S. Patent No. 5,069,793).
4. Claims 24-30, 32 and 33 stands rejected under 35 U.S.C. 103(a) as obvious over Kaschemekat (U.S. Patent No. 5,069,793).
5. Claim 31 stands rejected under 35 U.S.C. 103(a) as obvious over Kaschemekat in view of Wohlstadter 6,207,369.

(7) Argument

Enablement

The examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993) (examiner must provide a reasonable explanation as to why the scope of protection provided by a claim is not adequately enabled by the disclosure). A specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as being in compliance with the enablement requirement of 35 U.S.C. 112, first paragraph, unless there is a reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. MPEP. 2164.04.

"[t] is incumbent upon the Patent Office, whenever a rejection on this basis is made, to explain why it doubts the truth or accuracy of any statement in a supporting disclosure and to back up assertions of its own with acceptable evidence or reasoning which is inconsistent with

the contested statement. Otherwise, there would be no need for the applicant to go to the trouble and expense of supporting his presumptively accurate disclosure." *In re Marzocchi*, 439 F.2d 220, 224, 169 USPQ 367, 370 (CCPA 1971). 439 F.2d at 224, 169 USPQ at 370.

A patent need not teach, and preferably omits, what is well known in the art. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987); and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1463, 221 USPQ 481, 489 (Fed. Cir. 1984).

The fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation. *In re Certain Limited-Charge Cell Culture Microcarriers*, 221 USPQ 1165, 1174 (Int'l Trade Comm'n 1983), aff'd. sub nom., *Massachusetts Institute of Technology v. A.B. Fortia*, 774 F.2d 1104, 227 USPQ 428 (Fed. Cir. 1985). See also *In re Wands*, 858 F.2d at 737, 8 USPQ2d at 1404. The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. *In re Angstadt*, 537 F.2d 498, 504, 190 USPQ 214, 219 (CCPA 1976).

The amount of guidance or direction needed to enable the invention is inversely related to the amount of knowledge in the state of the art as well as the predictability in the art. *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970). The "amount of guidance or direction" refers to that information in the application, as originally filed, that teaches exactly how to make or use the invention. The more that is known in the prior art about the nature of the invention, how to make, and how to use the invention, and the more predictable the art is, the less information needs to be explicitly stated in the specification.

Indefiniteness

It is not necessary for the claims to recite every element needed for practical utilization of the claimed subject matter in order for a claim to be proper under 35 U.S.C. §112, second paragraph, *Bendix Corp. v. United States*, 600 F.2d 1364, 1369, 204 U.S.P.Q. 617, 621 (Court of Claims, 1979). It is not the role of the claims to enable one skilled in the art to reproduce the

invention, but rather to define the legal metes and bounds of the invention. *In re Geoffe*, 526 F.2d 1393, 1397, 188 U.S.P.Q. 131, (CCPA, 1975). The claims need not provide all operating details but a method claim should recite a positive step. *In re Erlich*, 3 U.S.P.Q. 2d 1011 (Bd. Pat. App. & Int., 1986).

Anticipation

"It is well settled that anticipation under 35 U.S.C. §102 requires the presence in a single reference of all of the elements of a claimed invention." *Ex parte Chopra*, 229 U.S.P.Q. 230, 231 (BPA&I 1985) and cases cited.

"Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim." *Connell v. Sears, Roebuck & Co.*, 220 U.S.P.Q. 193, 198 (Fed. Cir. 1983).

"This court has repeatedly stated that the defense of lack of novelty (i.e., 'anticipation') can only be established by a single prior art reference which discloses each and every element of the claimed invention." *Structural Rubber Prod. Co. v. Park Rubber Co.*, 223 U.S.P.Q. 1264, 1270 (Fed. Cir. 1984), citing five prior Federal Circuit decisions since 1983 including *Connell*.

In a later analogous case the Court of Appeals for the Federal Circuit again applied this rule in reversing a denial of a motion for judgment n.o.v. after a jury finding that claims were anticipated. *Jamesbury Corp. v. Litton Industrial Prod., Inc.*, 225 U.S.P.Q. 253 (Fed. Cir. 1985).

After quoting from *Connell*, "Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim," 225 U.S.P.Q. at 256, the court observed that the patentee accomplished a constant tight contact in a ball valve by a lip on the seal or ring which interferes with the placement of the ball. The lip protruded into the area where the ball will be placed and was thus deflected after the ball was assembled into the valve. Because of this constant pressure, the patented valve was described as providing a particularly good seal when regulating a low pressure stream. The court quoted with approval from a 1967 Court of Claims decision adopting the opinion of then Commissioner and later Judge Donald E. Lane:

[T]he term "engaging the ball" recited in claims 7 and 8 means that the lip contacts the ball with sufficient force to provide a fluid tight seal **** The Saunders flange or lip only sealingly engages the ball 1 on the upstream side when the fluid pressure forces the lip against the ball and never sealingly engages the ball on the downstream side because there is no fluid pressure there to force the lip against the ball. The Saunders sealing ring provides a compression type of seal which depends upon the ball pressing into the material of the ring. *** The seal of Saunders depends primarily on the contact between the ball and the body of the sealing ring, and the flange or lip sealingly contacts the ball on the upstream side when the fluid pressure increases. 225 U.S.P.Q. at 258.

Relying on *Jamesbury*, the ITC said, "Anticipation requires looking at a reference, and comparing the disclosure of the reference with the claims of the patent in suit. A claimed device is anticipated if a single prior art reference discloses all the elements of the claimed invention as arranged in the claim." *In re Certain Floppy Disk Drives and Components Thereof*, 227 U.S.P.Q. 982, 985 (U.S. ITC 1985).

Obviousness

"It is well established that the burden is on the PTO to establish a prima facie showing of obviousness, *In re Fritsch*, 972 F.2d. 1260, 23 U.S.P.Q.2d 1780 (C.C.P.A., 1972)."

In *KSR Intl. Co. v. Teleflex Inc.*, 127 S.Ct. 1727 (2007), the Supreme Court reversed a decision by the Court of Appeals for the Federal Circuit decision that reversed a summary judgment of obviousness on the ground that the district court had not adequately identified a motivation to combine two prior art references. The invention was a combination of a prior art repositionable gas pedal, with prior art electronic (rather than mechanical cable) gas pedal position sensing. The Court first rejected the "rigid" teaching suggestion motivation (TSM) requirement applied by the Federal Circuit, since the Court's obviousness decisions had all advocated a "flexible" and "functional" approach that cautioned against "granting a patent based on the combination of elements found in the prior art."

In *KSR* the Supreme Court even while stating that: "the Court of Appeals drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias," warned that: "a factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning."

The Court of Appeals, finally, drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias. A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U. S., at 36 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "'guard against slipping into the use of hindsight'" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F. 2d 406, 412 (CA6 1964))). Rigid preventative rules that deny factfinders recourse to common sense, however, are neither necessary under our case law nor consistent with it.

With respect to the genesis of the TSM requirement, the Court noted that although "As is clear from cases such as *Adams*⁵, a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known."

"The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." *In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Although the Commissioner suggests that [the structure in the primary prior art reference] could readily be modified to form the [claimed] structure, "[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." *In re Laskowski*, 10 U.S.P.Q. 2d 1397, 1398 (Fed. Cir. 1989).

"The claimed invention must be considered as a whole, and the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 488 (Fed. Cir. 1984).

⁵ *United States v. Adams*, 383 U. S. 39, 40 (1966)

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under Section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984) (emphasis in original, footnotes omitted).

"The critical inquiry is whether 'there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'" *Fromson v. Advance Offset Plate, Inc.*, 225 U.S.P.Q. 26, 31 (Fed. Cir. 1985).

(1) Claims 11-23 are based on a disclosure that is enabling

Claims 11-23

For the purposes of this appeal only claims 11-23 stand or fall together. Claim 11 is representative of this group of claims.

Claim 11 is directed to a fuel cartridge including a composite membrane residing in the housing of the fuel cartridge. The composite membrane includes a porous substrate, a polymer membrane disposed over a first surface of the porous substrate and a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.

In rejecting Appellant's claims as not enabled the examiner misuses the Summary of Claimed Subject Matter section of the prior Appeal Brief, stating:

Claims 11 -23 are rejected under 35 U.S.C. 11 2, first paragraph, as based on a disclosure which is not enabling. The location and orientation of the composite membrane within the housing is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). As recited claim 11 only recites that the composite membrane resides in the housing but does not recite any specific location or orientation within the housing. In the appeal brief filed 411 3109 in the Summary of Claimed Subject Matter applicants show the criticality of the location and orientation of the multilayer membrane specifically with regards to the embodiment illustrated in Figure 2B, which is described as being the representative embodiment recited in the claims. Currently there is no recitation in any of claims 11 -23 that clearly depicts the specific location and orientation of the composite membranes as illustrated in the

embodiment of Figure 2B. As currently recited the composite membrane can be located and oriented anywhere within the fuel cartridge, including but not limited to covering the fuel egress port and if the composite membrane does cover the fuel egress port than the instantly claimed invention cannot and will not function because of the methanol-impermeable layer of the composite membrane that will prevent the methanol from permeating out of the fuel cartridge.⁶

Appellant contends that the examiner has not produced any authority that permits the examiner to reject Appellant's claims as not enabled because Appellant has claimed the arrangement of the cartridge and the composite membrane without a limitation on orientation. Appellant contends that the examiner attempts to use a back-door to force Appellant to limit the scope of claim 11 with the benefit of any prior art that would require Appellant to narrow the scope. Appellant's disclosure adequately enables claim 11. The composite membrane is clearly described in Appellant's specification: "*An example of the multilayer membrane 48 as wound-cell includes vaporization membrane 48a disposed over a first surface of a substrate 48b of porous material that holds methanol in a liquid state within pores of the material to enable the liquid methanol to migrate to the membrane 48a and convert to a vapor phase.*"⁷ As described, the composite membrane holds liquid methanol in its pores and allows the liquid to emerge from the composite membrane in a vapor phase.

Such a membrane need not be at a specific location or orientation within the housing as long as it is within the housing, which is in fact recited by the claims. Further, the specification would enable one of ordinary skill in the art to position the composite membrane within the housing in any manner so desired including the manner depicted in FIG. 2B.

In the telephonic interview conducted on 04/13/2009, the examiner continued to allege that the claims recite a non functioning embodiment of the invention. The examiner derives this reasoning that the orientation is essential to the invention because Appellant had included material from the specification in the Summary of Claimed Subject Matter section of the prior Appeal Brief.

⁶ Office Action dated 06/04/2009, Page 2

⁷ Appellant's Specification, Page 6, lines 25-28

MPEP §2172.01 and the cases cited in that section⁸, clearly state that:

“[a] claim which omits matter disclosed to be essential to the invention as described in the specification... may be rejected under 35 U.S.C. §112, first paragraph as not enabling... such essential matter may include missing elements, steps or necessary structural cooperative relationships of elements described by the applicant(s) as necessary to practice the invention.”
(emphasis added)

Thus, in order for the examiner to properly construe the location as essential or necessary Appellant's specification must have described the location as being essential or necessary, which of course it did not. Nor for that matter did Appellant's Summary of Claimed Subject Matter described the location as being essential or necessary. Appellant contends that the application, as filed, did not describe any particular subject matter as “essential or necessary.”

The examiner cited *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976) as authority for this reasoning. *Mayhew* involved a case where the Applicant's specification described a cooling bath and its location as essential. No such statement however is found in Appellant's specification that any particular orientation or any particular element is essential. Nor has Appellant made any statements during prosecution that any particular location or element is essential to the invention.

The presence of material from one of Appellant's embodiments to show support for this claim does not constitute such statements. The examiner has not furnished any authority to the contrary. The examiner misconstrues the purpose of the Summary of Claimed Subject Matter

⁸ At the outset, it is well recognized that the patent's disclosure makes crystal clear that a particular (i.e., narrow) understanding of a claim term is an 'essential element of [the inventor's] invention.'”). See *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 45 USPQ2d 1498 (Fed. Cir. 1998); *Tronzo v. Biomet*, 156 F.3d at 1158-59, 47 USPQ2d at 1833 (Fed. Cir. 1998) (claims to generic cup shape were not entitled to filing date of parent application which disclosed “conical cup” in view of the disclosure of the parent application stating the advantages and importance of the conical shape.). A claim that omits an element which applicant describes as an essential or critical feature of the invention originally disclosed does not comply with the written description requirement. *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d at 1480, 45 USPQ2d at 1503; *In re Sus*, 306 F.2d 494, 504, 134 USPQ 301, 309 (CCPA 1962) (“[O]ne skilled in this art would not be taught by the written description of the invention in the specification that any ‘aryl or substituted aryl radical’ would be suitable for the purposes of the invention but rather that only certain aryl radicals and certain specifically substituted aryl radicals [i.e., aryl azides] would be suitable for such purposes.”) (emphasis in original).

section of an Appeal Brief, which is to "enable the Board to more quickly determine where the claimed subject matter is described in the application."⁹

Appellant's Specification adequately enables claim 11 and one skilled in the art with or without consulting Appellant's Specification would not arrange the composite membrane within a housing in an allegedly non-working fashion, as argued by the examiner. Further, assuming *arguendo* that the composite membrane does cover the fuel egress port as argued by the examiner, there is no basis for concluding that the claimed invention will not function. In fact, since the composite membrane in itself holds the fuel in its porous substrate, methanol vapor would permeate out of the polymer membrane to the fuel egress port. While this embodiment may not be the most desirable, in relation the disclosed embodiments, the examiner merely assumes that the invention would not work in the orientation assumed by the examiner, when clearly that is not the case.

Therefore, the examiner's reasoning is flawed and not based on the facts as taught by the Applicant's Specification and the features recited in Appellant's claims, Appellant submits that the Examiner is clearly not construing the claims in light of the Specification.

In the telephonic interview conducted on 06/13/2009, the examiner further alleged that a prior art search cannot be conducted for claim 11 since it is not adequately enabled. Appellant notes that claim 11 has been rejected multiple times in earlier office actions based on prior art references. Appellant's also notes that Appellant has been able to successfully overcome all of this previous prior art rejections. For instance, such rejections were withdrawn in light of arguments presented in the previous Appeal Brief filed 04/13/2009. Therefore Appellant finds the rejections under 35 U.S.C. 112 first paragraph not only untimely but also arbitrary and capricious. Appellant contends that the examiner relies on this rejection precisely because the examiner is unable to find any teaching in the prior art that satisfies the language of claim 11.

⁹ **>(v) Summary of claimed subject matter. A concise explanation of the subject matter defined in each of the independent claims involved in the appeal, which must refer to the specification by page and line number, and to the drawing, if any, by reference characters.< While reference to page and line number of the specification **>requires- somewhat more detail than simply summarizing the invention, it is considered important to enable the Board to more quickly determine where the claimed subject matter is described in the application. > MPEP 1205.02 (v)

(2) Claims 11-23 distinctly claim the invention

Claims 11-23

For the purposes of this appeal only claims 11-23 stand or fall together. Claim 11 is representative of this group of claims.

The examiner rejects claims 11-23 under 35 U.S.C. second paragraph as failing to set forth subject matter which the Applicant regards as their invention. The Examiner states:

Claims 11-23 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: specific location and orientation of the composite membrane within the fuel cartridge housing.

Appellant disagrees and contends that claims 11-23 distinctly point out the claimed invention. For analogous reasons mentioned above with respect to the rejections under 35 U.S.C. 112 first paragraph, claim 11 does not omit any essential structural cooperative relationship of elements as alleged by the examiner.

The examiner appears to misunderstand the role of the claims. It is not the role of the claims to enable one skilled in the art to reproduce the invention, but rather to define the legal metes and bounds of the invention. *In re Geoffe*, 526 F.2d 1393, 1397, 188 U.S.P.Q. 131, (CCPA, 1975). In the present case Appellant's do not consider it necessary to specify any orientation of the membrane at least because the examiner has failed to produce any prior art that would require Appellant to limit the scope of the claims to any particular orientation. It is sufficient to distinguish over the art that the composite membrane be within the housing. One skilled in this art would clearly understand the metes and bounds of the invention, as expressed in these claims, and would realize that the claim generically covers various orientations in the cartridge of the composite membrane.

**(3) Claims 24, 26-30, 32 and 33 are not
anticipated by Kaschemekat**

Claims 24 and 26

For the purposes of this appeal, claims 24 and 26 stand or fail together. Claim 24 is representative of this group of claims.

Appellant contends that Kaschemekat neither describes nor suggests a composite membrane including “a coating of a methanol-impermeable material disposed over an opposite surface of a substrate.” Kaschemekat, in stark contrast, requires all layers of the membrane to be permeable to the fuel in order to function. The membrane in Kaschemekat is designed to achieve optimum flow throughput¹⁰ and has a feed side and a permeate side.¹¹ A liquid mixture fuel is in contact with the feed side of the membrane. The liquid fuel *passes through* the membrane and is removed in vapor form from the permeate side “One or more of the feed liquid components pass through the membrane and are withdrawn in vapor form on the permeate side.”¹² In fact, Kaschemekat specifically describes the permselective layer to be thin such that very high permeate vapor fluxes may be obtained.¹³

Kaschemekat also discloses that: “Glue is used to seal the ends and edges of the module, and to ensure that there is no vapor-transferring communication between the feed and the permeate sides of the membrane, except through the membrane.”¹⁴ This teaching clearly ensures that there is no vapor transfer between the two sides of the membrane. Therefore there is not any vapor transfer, except *through* the layers that comprise the membrane, clearly proving that a methanol impermeable coating is not inherent or present in Kaschemekat.

Further, the membrane described by Kaschemekat has four layers, the outermost layers being the permselective layers that the examiner alleges could be impermeable to methanol¹⁵:

¹⁰ Kaschemekat, Abstract

¹¹ *Id.*, Col. 11, lines 40-42.

¹² *Id.*, Col. 4, lines 40-42.

¹³ *Id.*, Col. 10, lines 59-64.

¹⁴ *Id.*, Col. 11, lines 38-42.

¹⁵ *Id.*, Col. 12, lines 47-50.

A multilayer composite membrane was prepared by casting an asymmetric membrane on a support web of non-woven polyester. A thin permselective layer was dip-coated onto the asymmetric support.

Therefore, Kaschemekat describes layers of the same permselective material on both sides of the asymmetric support and neither of these layers can be impermeable to the fuel being used, else the arrangement of Kaschemekat would be inoperative. Rather, both sides of the membrane described in Kaschemekat are *required* to be permeable to the fuel either in a liquid or a vapor state. The membrane of Kaschemekat achieves permeate flow throughput¹⁶ while the composite membrane of the present application holds methanol within pores of the substrate.¹⁷

Claim 25

Claim 25 depends from claim 24 and is therefore patentable for at least the reasons for which claim 24 is patentable. Further, claim 25 recites that the “substrate is provided to hold methanol in a liquid state within the porous material to enable liquid methanol to migrate to the polymer membrane and convert to a vapor phase.” Applicant contends that Kaschemekat neither describes nor suggests at least the foregoing features of claim 25.

First, Kaschemekat does not describe using methanol as a fuel. Further, Kaschemekat does not even suggest, much less disclose, the substrate holding liquid methanol and enabling the liquid methanol to migrate to the polymer membrane and convert to a vapor phase. In order to *hold* methanol within its porous substrate, the membrane of Kaschemekat would require at least one of its outer layers to be impermeable to methanol. Kaschemekat, on the other hand is directed to achieve flow throughput of permeate *through* the membrane and therefore describes all layers of the membrane to be permeable to the fuel used.

Claim 27

Claim 27 depends from claim 24 and is therefore patentable for at least the reasons for which claim 24 is patentable. Claim 27 further requires that the “gaps between the polymer

¹⁶ *Id.*, Abstract

¹⁷ Appellant's Specification, Page 6, Lines 25-28

membrane and the methanol-impermeable coating providing a path for transporting a high flux of methanol vapor.” Kaschemekat does not teach that the gaps in conjunction with the methanol-impermeable coating provide a path that permits a high flux of vapor. With this arrangement the methanol-impermeable coating on the composite membrane permits vapor to build up inside of the membrane and emerge from the membrane having a higher density or concentration of vapor.

Claims 28-30, 32 and 33

Claims 28-30, 32 and 33 claim specific combination of materials that are selected based upon the desire to provide a methanol impermeable layer for composite membrane and are each distinguishable over Kaschemekat. Considerations of the specifics of construction of a composite membrane using a methanol impermeable layer are not present in any of Kaschemekat's teachings.

Therefore, for example claim 28, which limits the membrane of claim 24 and requires that the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers; claim 29, which limits claim 24 and requires that the polymer material is selected from the group consisting of polyurethanes, silicones, poly(trimethylsilyl-propyne), polymeric compositions, and composites; and claim 30, which limits the membrane of claim 24 and requires the polymer has a microporosity characteristic to govern vaporization further distinguish over Kaschemekat.

Similarly, claim 32 wherein the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface fluorinated high density polyethylene, or other methanol-impermeable material and claim 33 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers; the polymer membrane is polyurethanes, silicones, poly(trimethylsilyl-propyne), or composites of polyurethanes, silicones, poly(trimethylsilyl-propyne) and the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface treated fluorinated high density polyethylene further distinguish over Kaschemekat because each of these combinations require

that the selection based on the principles of the claimed invention which are not suggested by the principles of Kaschemekat.

(4) Claims 24-30, 32 and 33 are not obvious over Kaschemekat

For the purposes of this appeal, claims 24 and 26 stand or fail together. Claim 24 is representative of this group of claims.

The examiner argued in the alternative that claims 24-30, 32 and 33 were obvious over Kaschemekat:

In the alternative it would have been obvious to one having ordinary skill in the art to select the permselective polymer coating based on its specific selectivity since there are a finite number of identified, predictable solutions identified in Kaschemekat and Kaschemekat specifically teaches that the permselective polymer coating is chosen based on its specific selectivity.¹⁸

Modifying Kaschemekat with a methanol impermeable layer is not a matter of obvious design choice, as contended by the Examiner, at least because such a choice would violate the basic operating principles of Kaschemekat and the motivation for such a choice comes from Appellant's claims/specifications, and not from Kaschemekat, the other prior art, common knowledge of reasoned decision making on the part of the examiner.

In the office action dated 06/04/2009, the Examiner seems to maintain his position that it would be obvious to select the permselective polymer coating of Kaschemekat to be methanol impermeable:

Kaschemekat further teaches that the permselective polymer coating is chosen for their specific selectivity. It is submitted that due to the breadth of the recitation in claims 28 and 33 of "other analogous polymers or composites", the polyester support web falls within said genus and the burden is shifted to applicants to prove in the form of evidence otherwise.

¹⁸ Office action dated 06/04/2009, page 5

Assuming *arguendo* that one of ordinary skill modifies Kaschemekat, as alleged by the examiner, Appellant contends that such a modification would not result in Appellant's claimed features, but instead would merely render Kaschemekat's composite membrane inoperable and hence would offer no basis to modify Kaschemekat's composite membrane to include a methanol impermeable layer, as in Appellant's claim 11.

"The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device."

Ex parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).

In the Advisory Action¹⁹ the Examiner alleged that Appellant has failed to show evidence that all layers of Kaschemekat are in fact permeable to methanol. The Examiner states:

Furthermore the burden was shifted to applicants to prove with evidence not arguments that the material of the prior art is not methanol impermeable, said burden has not been met. Conclusory statements are not probative unless supported by facts....

Applicants provide passages for supposed support that the layer of Kaschemekat is "methanol" permeable, however none of the cited passages state anything regarding "methanol". Furthermore Hockaday is the primary reference which as already discussed in the grounds of rejection contains a methanol-impermeable coating.²⁰

The cited portions^{6,7} from Kaschemekat clearly show that the operating principles of the membrane in Kaschemekat require the membrane to be permeable to the liquid fuel being used. Therefore, assuming *arguendo* that it would be suggested to modify the membrane of Kaschemekat to accommodate methanol, as the Examiner urges, the membrane would in fact have to be modified to be permeable to methanol in order to use the principals taught by Kaschemekat. Any other conclusion would be a still further, unsupported and illogical modification of the Kaschemekat to completely change the principle of operation of

¹⁹ dated 03/02/2009

²⁰ *Id.*, Page 2

Kaschemekat. It is evident, that the motivation to make one of the layers impermeable to methanol comes from reading Appellant's claims/specification and is the direct result of the examiner's partaking in *ex post* reasoning in direct contravention of the cautions warned against by the Court in *KSR*.

Claim 25

Claim 25 depends from claim 24 and is therefore patentable for at least the reasons for which claim 24 is patentable. In addition, the function as expressed in claim 25 that in the membrane the substrate is provided to hold methanol in a liquid state within the porous material to enable liquid methanol to migrate to the polymer membrane and convert to a vapor phase cannot be accomplished by the arrangement taught by Kaschemekat.

Claim 27

Claim 27 depends from claim 24 and is therefore patentable for at least the reasons for which claim 24 is patentable. Claim 27 further requires that the "gaps between the polymer membrane and the methanol-impermeable coating providing a path for transporting a high flux of methanol vapor." Kaschemekat does not teach that the gaps in conjunction with the methanol-impermeable coating provide a path that permits a high flux of vapor, as discussed above for the anticipation rejection.

Claims 28-30, 32 and 33

Claims 28-30, 32 and 33 claim specific combination of materials that are selected based upon the desire to provide a methanol impermeable layer for composite membrane and are each distinguishable over Kaschemekat and are not obvious at least for the reasons given above because the considerations of the specifics of construction of a composite membrane using a methanol impermeable layer are not suggested in any of Kaschemekat's teachings or the other cited prior art but instead are derived from Appellant's claims/specification by application of *ex post* reasoning by the examiner.

**(5) Claim 31 are not obvious over Kaschemekat
in view of Wohlstadter**

Claim 31 limit the membrane to be comprised of a sintered metal disc coated with a polymer. At least for the reasons given for claim 24, these claims are also patentable over the alleged combination of Kaschemekat and Wohlstadter because no combination suggests that the membrane is comprised of a sintered metal disc coated with a polymer.

Respectfully submitted,

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Appendix of Claims

Claims 1-10 are canceled.

11. A fuel cartridge that supplies a source of fuel to a direct methanol fuel cell, the fuel cartridge comprising:

a housing;

a fuel egress port supported by the housing; and

a composite membrane residing in the housing of the fuel cartridge comprising:

a porous substrate;

a polymer membrane disposed over a first surface of the porous substrate; and

a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.

12. The fuel cartridge of claim 11 wherein substrate is provided to hold methanol in a liquid state within the porous material to enable liquid methanol to migrate to the polymer membrane and convert to a vapor phase.

13. The fuel cartridge of claim 11 wherein the composite membrane is wound into a cylindrical shaped element.

14. The fuel cartridge of claim 11 wherein gaps between the polymer membrane and the methanol-impermeable coating providing a path for transporting a high flux of methanol vapor to the egress port.

15. The fuel cartridge of claim 11 wherein a plurality of the composite membranes are disposed in the fuel cartridge.

16. The fuel cartridge of claim 11 wherein a plurality of the composite membranes are disposed in the fuel cartridge and wound into a cylindrical shaped element.

17. The fuel cartridge of claim 11 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers.

18. The fuel cartridge of claim 11 wherein the polymer membrane is a polyurethane material.

19. The fuel cartridge of claim 11 wherein the polymer material is selected from the group consisting of polyurethanes, silicones, poly(trimethylsilyl-propyne), polymeric compositions, and composites.

20. The fuel cartridge of claim 18 wherein the polymer has a microporosity characteristic to govern vaporization.

21. The fuel cartridge of claim 11 wherein the membrane is a sintered metal disc coated with a polymer.

22. The fuel cartridge of claim 11 wherein the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface fluorinated high density polyethylene, or other methanol-impermeable material.

23. The fuel cartridge of claim 11 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers; the polymer membrane is a polyurethane, a silicone, poly(trimethylsilyl-propyne), or composites of polyurethanes, silicones, poly(trimethylsilyl-propyne) and the

methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface treated material such as surface fluorinated high density polyethylene, or other methanol-impermeable material.

24. A composite membrane comprising:
a porous substrate;
a polymer membrane disposed over a first surface of the porous substrate; and
a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.

25. The membrane of claim 24 wherein substrate is provided to hold methanol in a liquid state within the porous material to enable liquid methanol to migrate to the polymer membrane and convert to a vapor phase.

26. The membrane of claim 24 wherein the composite membrane is wound into a cylindrical shaped element.

27. The membrane of claim 24 wherein gaps between the polymer membrane and the methanol-impermeable coating providing a path for transporting a high flux of methanol vapor.

28. The membrane of claim 24 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers.

29. The membrane of claim 24 wherein the polymer material is selected from the group consisting of polyurethanes, silicones, poly(trimethylsilyl-propyne), polymeric compositions, and composites.

30. The membrane of claim 24 wherein the polymer has a microporosity characteristic to govern vaporization.

31. The membrane of claim 24 wherein the membrane is a sintered metal disc, coated with a polymer.

32. The membrane of claim 24 wherein the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface fluorinated high density polyethylene, or other methanol-impermeable material.

33. The membrane of claim 24 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers; the polymer membrane is polyurethanes, silicones, poly(trimethylsilyl-propyne), or composites of polyurethanes, silicones, poly(trimethylsilyl-propyne) and the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface treated fluorinated high density polyethylene.

Claims 34-39 are withdrawn.

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Evidence Appendix

None

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Related Proceedings Appendix

None